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TITLE: INFLATABLE SUPPORT SYSTEM

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INFLATABLE SUPPORT SYSTEM

RELATED APPLICATIONS

[0001] The present patent document is a continuation-in-part of Application Serial No. 10/117,343, filed April 8, 2002, which claims priority to Application Serial No. 09/918,561, filed August 1, 2001 and is related to Design Application Serial No. 29/158,559, filed April 8, 2002. All of the foregoing applications are hereby incorporated by reference in their entirety.

[0002] The present patent document also claims the benefit of the filing date under 35 U.S.C. §119(e) of Provisional U.S. Patent Application Serial No. 60/396,378, filed July 17, 2002, which is hereby incorporated by reference in its entirety.

BACKGROUND

[0003] 1. Technical Field

[0004] The present invention relates to the field of inflatable support systems, particularly to an inflatable support system having at least two sections and an improved level of comfort.

[0005] 2. Background Information

[0006] Inflatable mattresses have been available for many years. It is desirable for inflatable mattresses to have as high a comfort level as possible. One way to further improve the comfort level of inflatable mattresses is to provide a secondary chamber positioned on top of a lower chamber. The lower chamber provides support for the user, while the upper chamber may be specially designed to increase the user's comfort level.

[0007] Related application Serial No. 10/117,343, filed April 8, 2002, of which this application is a continuation-in-part, discloses an inflatable support system having two separate chambers. The top and bottom chambers of this support system are in fluid communication with each other, and are formed from the same material. The top chamber is constructed such that the outer circumference can be

sealed to the lower component. This leads to improved comfort over prior inflatable mattresses, but it is desirable to further improve the comfort level.

BRIEF SUMMARY

[0008] Disclosed herein is an inflatable support system having at least two sections. The inflatable support system has a lower chamber that has a top and bottom layer. The inflatable support system also has an upper portion which includes a top and bottom layer in fluid communication with the lower chamber. At least one of either the top or bottom layers of the upper portion of the inflatable support system has a higher elasticity than at least one of the layers of the lower chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Figure 1 is a perspective view of an embodiment of the present invention;

[0010] Figure 2 is an alternate perspective view of the embodiment shown in Figure 1;

[0011] Figure 3 is a top planar view of the embodiment of Figure 1;

[0012] Figure 4 is a bottom planar view of the embodiment of Figure 1;

[0013] Figure 5 is a side planar view of the embodiment of Figure 1;

[0014] Figure 6 is a side planar view of the embodiment of Figure 1;

[0015] Figure 7 is a side planar view of the embodiment of Figure 1;

[0016] Figure 8 is a perspective view of the embodiment of Figure 1 presented such that the interior can be seen;

[0017] Figure 9 is a perspective cut-away view of the embodiment shown in Figure 1;

[0018] Figure 10 is a perspective view of the enlarged portion of Figure 9;

[0019] Figure 11 is a close up view of a corner of the embodiment shown in Figure 1;

[0020] Figure 12 is an exploded view of the embodiment of Figure 1; and

[0021] Figure 13 is an alternative embodiment of the present invention showing a sinusoidal wave welding pattern.

DETAILED DESCRIPTION OF THE DRAWINGS AND THE PRESENTLY PREFERRED EMBODIMENTS

[0022] Referring in combination to FIGS. 1-12, a first embodiment of the air mattress 10 of the present invention is shown. The mattress 10 comprises a lower chamber 12 and an upper portion 14. In a first embodiment, this lower chamber 12 and upper portion 14 are in the shape of a conventional mattress, but can also take other shapes and sizes as needed. For example, the lower chamber 12 could be king, queen, twin or full-sized. Other sizes and shapes are also envisioned. The lower chamber 12 is formed from a top layer 16, a side gusset 18 and a bottom layer 20. The side gusset 18 connects the top layer 16 and bottom layer 20. The side gusset 18 can be continuous with the top 16 and bottom 20 layers, or can be welded to the top 16 and bottom layers 20. In the first embodiment, the mattress 10 of the present invention includes a first 22 and a second 24 valve. The first valve 22 is located on a side 26 of the lower chamber 12 opposite the side 28 where a pump 30 is attached. Alternatively, the first valve 22 could be positioned at any location on the side gusset 18. The first valve 22 is used to rapidly deflate the mattress 10 when necessary. An example of such a valve is described in U.S. Pat. Nos. 5,267,363; 5,367,726; and 6,237,621 to Chaffee.

[0023] Furthermore, in this embodiment, the present invention includes a second valve 24 utilized to adjust the comfort level of the mattress 10. This second valve 24 is positioned on or adjacent to the pump 30, although it can be located anywhere on the mattress 10. An example of such a second valve positioned on a pump is described in U.S. Pat. Nos. 5,267,363 and 5,367,726 to Chaffee.

[0024] The lower chamber 12 and an upper portion 14, each constructed of flexible panels having varying levels of elasticity defined by the type of material used to construct each panel. The lower chamber 12 has a top layer 16 formed from a polyvinyl material such as K-70 18-gauge PVC, while the bottom layer 20

is preferably formed from a higher gauge K-70 PVC material, such as 28-gauge. The side gusset 18 is formed from the same material as the top layer 16 of the lower chamber 12. Alternatively, the side gusset 18 could be formed from other materials, such as K-70 28-gauge PVC.

[0025] Internal to the lower chamber 12 are structural elements that perform a similar function to the coils of a conventional mattress. These elements, or "coils" 32 as referred to herein, are utilized to provide support within the lower chamber 12. As is more clearly shown in FIG. 10, in one embodiment the coils 32 have the shape of elongated ovals, and extend from the bottom layer 20 of the lower chamber 12 to the top layer 16 of the lower chamber 12. The coils 32 are sealed at each end and form interstitial spaces between them. The sealed ends 34 of the coils 32 are sonically welded to the top and bottom layers 16, 20 of the lower chamber 12. The coils 32 are formed from K-80 16-gauge PVC material to provide flexibility. The coils 32 are preferably aligned in parallel rows extending across the lower chamber 12. This parallel arrangement of coils 32 in the lower chamber 12 forms channels through which air flows during inflation. The arrows and dotted lines in FIG. 8 show the path of air as the lower chamber 12 is inflated.

[0026] The overall effect of the coil 32 shape and arrangement is to form a box-like construction for the lower chamber 12, much like a conventional mattress. The use of materials such as K-70 18 and 28-gauge PVC adds to the strength of the lower chamber 12, while materials such as K-80 16-gauge PVC add to the flexibility of the lower chamber 12. The use of higher gauge material such as K-70 28-gauge PVC in the bottom layer 20 of the lower chamber 12 is beneficial because such material is "stiffer" than the lower gauge material used in the other layer of the lower chamber 12. This material has more resistance to bias, and thus prevents the sides of the mattress 10 from curling up when inflated. This allows the mattress 10 to remain flat on a surface.

[0027] In an alternative embodiment not shown in the Figures, the lower chamber 12 is continuous, and does not contain any coils 32 for extra support. The use of differently-shaped coils and different arrangements of coils 32, such as

those coils described in U.S. Design Application Serial No. 29/154,102 is also envisioned.

[0028] The first embodiment of the present invention also comprises a pillow member upper portion 14 affixed to the lower chamber 12. As shown in exploded view in FIG. 12, the upper portion 14 is constructed from a top 36 and a bottom 38 layer, each constructed from K-80 16-gauge PVC, which are then sonically welded or otherwise attached to the top layer 16 of the bottom chamber 12. The top layer 36 of the upper portion 14 is positioned on top of the bottom layer 38 of the upper portion 14 and is preferably formed from high elastic K-80 16-gauge PVC. The top 36 and bottom 38 layers are shaped to substantially match the shape of the lower chamber 12, but these layers do not extend completely to the side gusset 18 of the lower chamber 12. The top 36 and bottom 38 layers are welded together around the edges of the top and bottom layers 36, 38, and the bottom layer 38 of the upper portion 14 is preferably welded to the top layer 16 of the lower chamber 12 along the outer edge 40 of the bottom layer 12. This allows the upper portion 14 to form a pillow member upper portion 14 with increased comfort without extending past the sides of the lower chamber 12 or extending significantly above the top layer 16 of the lower chamber 12. This also eliminates the need for an additional supporting structure around the upper chamber 14. The upper portion 14 is welded to the lower chamber 12 by sonic welding or chemical bonding. Other types of welding known in the art are also envisioned.

[0029] In an alternative embodiment, the bottom layer 38 of the upper portion 14 can be constructed from K-80 PVC having different gauges than those described in the first embodiment, as long as it is a material that has a higher elasticity than the material used to construct the side gusset 18 and/or the bottom layer 20 of the lower chamber 12. In such an embodiment, the bottom layer 38 of the top portion 14 is the top layer 16 of the bottom chamber 12.

[0030] The lower chamber 12 of the present invention is inflatable using a pump 30, and deflatable using a first 22 and/or a second valve 24. The valves 22, 24 may be any type of valves known in the art, capable of allowing easy deflation. The pump 30 may be attached to the mattress 10, or can be detachable.

[0031] Different pumps 30 may be utilized in the present invention. In one embodiment, the pump 30 can be battery or DC-powered. Alternatively, the pump can plug into a standard household electrical socket. The pump 30 may be externally or internally mounted, and may incorporate a control that allows a user to control the pressure within the mattress 10 such as those described in U.S. Pat. Nos. 5,267,363 and 5,367,726, both to Robert Chaffee. The pump 30 should be powerful enough to fill both the upper portion 14 and lower chamber 12 of the mattress 10 with a gas or fluid, such that the lower chamber 12 in combination with the upper portion 14 provide a comfortable surface for a user. The pump 30 can be designed to automatically stop inflating the mattress 10 when the pressure within the mattress 10 reaches a certain level. Furthermore, the pump 30 could also monitor the pressure within the mattress 10 and automatically activate in order to maintain a specific pressure.

[0032] The combination of the pump 30 and the second valve 24 allows a user to adjust the comfort level of the mattress 10 by adjusting the pressure in the mattress 10. A user can increase the pressure by using the pump 30 to add air to the mattress 10, and decrease the pressure by gradually letting air escape at the second valve 24.

[0033] It is also possible to utilize a detachable pump, which is not illustrated. Such a pump could be removably attached to the mattress 10. If such a pump were used, a single valve could be used to both inflate and deflate the mattress 10. In such an embodiment, the pump could removably attach to this valve for inflation, and then be removed for deflation. An example of such a detachable pump is described in U.S. Pat. No. 6,237,653 to Robert Chaffee. Only one valve is necessary in such an embodiment.

[0034] In all embodiments, the upper portion 14 is fluidly connected to the lower chamber 12 by openings 42 defined in the top layer 16 of the lower chamber 12 and the bottom layer 38 of the upper portion 14. These openings 42 are defined in the corners of the upper portion 14 near the edges, as shown in FIG. 10. Air can then flow from the lower chamber 12 through the openings 42 and into the upper portion 14 allowing inflation of both the upper 14 and lower 12 sections of the

mattress 10 at the same time. In the preferred embodiment shown in FIGS. 1-12, the openings 42 are present in both the top layer 16 of the bottom chamber 12 and the bottom layer 38 of the top portion 14. Welds are preferably included around the openings 42 for added durability.

[0035] In the preferred embodiment, four such openings 42 are defined and located in the corners of the upper portion 14. It is also possible to define the openings 42 in alternative positions, or to use a larger or smaller number of openings 42. A preferred opening 42 size is ¾" in diameter, but larger or smaller openings 42 can be utilized without deviating from the claimed invention. The openings 42 can also take shapes other than circular, such as star-shaped or four-pointed. The openings 42 can also include reinforced PVC around their circumference to enhance their durability.

[0036] The upper portion 14 is preferably of a specialized construction that, along with the high elastic K-80 material, allows it to provide a more comfortable sleeping surface. As is shown more clearly in FIGS. 10 and 11, the upper portion 14 is constructed such that at least two types of chambers are formed. These chambers 44, 46 are formed as a result of two types of welds 48, 50. Large welds 48 are positioned parallel to each other and are equally spaced apart. These large welds 48 extend nearly to the edges 52 of the upper portion 14, leaving a passage 54 between the first type of chamber 44 and the edges 52 of the upper portion 14. The first type of chamber 44 is located along two sides 56 of the upper portion 14. This passage 54 allows air to pass between each first type of chamber 44 as the upper portion 14 is inflated. The passages 54 also allow air to travel between each first type of chamber 44 when weight is applied to the mattress, allowing it to automatically adjust to maintain comfort.

[0037] The second types of welds 50 are evenly spaced and arranged parallel to each other. The second type of weld 50 is positioned perpendicular to the first type of weld 48 and forms a second type of chamber 46 in the upper portion 14. This second type of chamber 46 has two fluid connections 58 to each adjacent chamber. These fluid connections are formed as a result of the location of the second type of weld 50, which does not come in contact with the first type of weld

48. When the pump 30 inflates the lower chamber 12, the air flows into the upper portion 14 and then through the openings 42 connecting the lower chamber 12 and upper portion 14. The air then flows in the direction shown by the arrows in FIGS. 10 and 11 until the entire upper portion 14 is inflated.

[0038] The two types of chambers 44, 46 in the upper portion 14 allow the upper portion 14 to adjust as different amounts of pressure are applied to different areas of the upper portion 14 by a user's body. Air can move between the two types of chambers 44, 46 through the fluid connections 58 between the chambers 44, 45. This specialized construction, along with the pliable material of the upper portion 14, provides an increased amount of comfort above and beyond conventional air mattresses.

[0039] Alternatively, the upper portion 14 can have a textured appearance formed by welding or stamping a pattern on the top layer 36 of the upper portion 14. One embodiment of the present invention having an upper portion 14 with a textured appearance is formed by applying welding dies to the top layer 36 of the upper portion 14 that are substantially sinusoidal in design. Furthermore, in another embodiment, as shown in FIG. 13, successive sinusoidal welding patterns are substantially out of phase.

[0040] The claimed invention also encompasses a method of supporting a user. The present method comprises first providing an air mattress 10 having two fluidly connected air chambers 12, 14, each of which being at least partially formed by panels having varying levels of elasticity. As in the previously described embodiments, these panels are preferably formed from PVC materials having either high elasticity such as K-80 16-gauge PVC or lower elasticity such as K-70 18 or 28-gauge PVC. A pump 30 is also provided and is connected to at least one of these air chambers 12, 14, and the chambers 12, 14 are inflated using this pump 30. The method further comprises the step of providing a plurality of structural elements such as the coils 32 described previously. These coils 32 are defined within one of the chambers 12, and they provide additional support for a user. These structural elements are preferably defined in a lower chamber 12. The

method further comprises the step of providing a valve defined in at least one of the chambers 12, 14 which allows the chambers 12, 14 to be gradually deflated.

[0041] It should be noted that there could be a wide range of changes made to the present embodiments without departing from the scope of the claimed invention. As noted, the welding pattern on the upper portion 14 could take different forms. The entire mattress 10 could also be constructed in any number of shapes and sizes.

[0042] It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting, and that it be understood that it is the following claims, including all equivalents, that are intended to define the spirit and scope of this invention.